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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/030,913	04/26/2002	Alf Pettersen	P 290591	9935

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EXAMINER	
ROSENBERGER, RICHARD A	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

E4

Office Action Summary	Application No.	Applicant(s)	
	10/030,913	PETTERSEN, ALF	
	Examiner	Art Unit	
	Richard A. Rosenberger	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pryor (US 4,838,696) and Pryor (US 4,753,569), taken together.

As in claim 1, Pryor '696 shows a sensor unit with apparatus for local, point by point detection of surface geometry, wherein the sensor unit includes an optical scanner (16) for non-touch probing and detection of the surface geometry of the object (see figure 2). The sensor unit is mounted on a robot arm (14) and has position measuring unit (various components) for determining the position of the sensor unit, with a computing unit to relate the optical scanner data and the position data.

Pryor '696 does not use a camera-based sensor and a network of reference points in known positions for determine the position of the sensor unit.

Pryor '569 discloses that for such robot arms, "it is impossible to guarantee positional accuracy of the operative end 12 under all conditions" (column 3, line 9-11), and to achieve this accuracy shows (in figure 2) measuring the position of an "operative end" mounted on a robot arm in which a camera based unit (including cameras 25, 26) are mounted on the end of the robot arm and view a network of reference points (28, 28) to determine the position of the "operative end", and teaches that by placing the cameras on the arm and the reference points off the arm "the accuracy of

the solution may be considerably higher" than the reverse placement (column 4, lines 44-47). Pryor '569 notes that the "operative end" may be a measurement device (column 3, lines 2-3).

It would have been obvious to use the known position measuring arrangement of Pryor '569 to measure the position of the optical scanner on the robot arm of Pryor '696 because both are direct to the same general problem (locating in space the position of an "operative end" mounted on a robot arm), and mounting the camera-based unit on the robot arm in known and is known to produce accurate measurements with out the relatively complex combination of systems used by Pryor '696. Prior '696 discusses the fact that the robot are can "droop' (column 3, lines 21-23); the system of Pryor '696 will measure the effect of this droop, demonstrating the compatibility and substitutability of the two systems for determining the position of the measuring head.

Similarly for claims 10 and 12; as set forth above, the reference show or suggest the sensor unit comprising apparatus for local, point by point detection of the surface geometry of an object, a position measuring unit to determine the position of the sensor unit in relation to a network of points in known positions relative to a global coordinate system, and a robot arm which moves the sensor unit. The operation of the arrangement clearly involves locating the sensor unit so that the surface to be measured is inside a measurement volume of the apparatus, and making the measurement of the surface, and using the position measuring point to determine the coordinated system of the network, and transferring the data to a processor; both references teach a computer to process the data. The references do not disclose that the two measurements be made "simultaneously" as claimed in claims 10 and 12; as the two measurement systems are separate, and the possibility that error in the position of the measuring head can in introduced upon any movement of the head by the robot arm, it would have been obvious to perform the two measurements simultaneously in order to determine the

position of the head at the actual time of the measurement of the surface and thus reduce to a minimum the possibility of the error.

As for claim 12, the position measuring system requires that the reference points be inside a measuring volume of the apparatus, and Pryor '569 teaches at least three reference points be measured. Claim 12, which allowing for repositioning the measuring head to measure more than one reference point, it does not require such, and thus encompasses the measurement of all of three reference points with a single locating step as apparently envisioned by Pryor '569. The use of any known processing algorithm, including the claimed "transformation matrix" of claim 12, would have been obvious; matrix algebra is so well known that official notice is sufficient.

As in claims 2, 4, and 11, moving the senor head over the object in Pryor '696 in "stepwise movement" to position the measuring head in the desired locations would have been obvious because such movement would allow time to make the measurements at the various locations without needing concern over movement during the measurements affecting the accuracy of the measurements.

As in claim 3, Pryor '569 notes that the reference points "may also be located ... on the objects themselves" (column 5, lines 17-20). Pryor '569 discloses that the targets can be of different forms (see column 6, lines 4-5), teaching that the exact form is not critical; what is critical is that the targets be of a form that is detectable by the cameras. Given the scope of the disclosure, those in the art could choose any convenient detectable form for the targets, including the "holes or depressions" of instant claims 8 and 9.

As in claim 5, Pryor '696 shows using a laser based triangulation system as the optical scanner (see figure 2, and column 3, lines 34-38). The use of similar known laser based triangulation systems, or other known sensor systems that measure the distance to the surface being measured, would have been obvious. As in claim 6, the references shows arm-based robots; the type of known

robot arm used to manipulate the sensor system is a matter of obvious choice requiring only ordinary skill and knowledge in the art.

As for claim 7, Pryor '569 teaches that the cameras can be "solid state photodetector arrays of the type having a large number of separate photodetectors" (column 3, lines 66-68) and are "relatively light" (column 4, line 31). The choice of known CCD cameras, which have these characteristics, for the cameras of the reference would have been obvious.

3. The remarks filed 9 March 2005 have been considered, but have not been found to be persuasive.

Pryor '696 teaches determining the position of the measuring head of such a optical scanner mounted on a robot arm; those in the art would have recognized that other known means of determining the position of the measuring means on the robot arm would give the same beneficial results, and thus would have found the substitution obvious.

The remarks appear to suggest that the system of Pryor '569 does not measure position (remarks page 7, first full paragraph). This is not correct. The system measures the position of the head in up to all six degrees of freedom (column 3, lines 34-37; column 5, lines 21- 23). It can only make the corrections to the robots memory for a position by measuring the position; if it did not measure the position it could not make the correction because I it would not "know" what the position actually was make the comparison and correction.

While it is true that neither reference by itself teaches all that is claimed, the rejection is not based upon any allegation that either does. Pryor '696 teaches that is such a robot-mounted measuring system the position of the measuring head needs to be determined by measuring means, and Pryor '569 teaches a known measuring means which determines the position of the

"operative end" or a robot arm. The substitution is simple, direct, and serves the functions explicitly taught by the references in the manner taught be the references.

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A Rosenberger whose telephone number is (571) 272-2428. The examiner can normally be reached on Monday through Friday during the hours of 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. A. Rosenberger
26 May 2005

Richard A. Rosenberger
Primary Examiner